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PCT-Application No.: PCT/IB02/05531
Applicant: Nokia Corporation
Our ref.: WO 36757 (Frist: 19.1. Eing.)

Reference is made to the Written Opinion dated September 20, 2004.

Enclosed new claims 1 to 43 replacing original claims 1 to 46 are filed upon which the further prosecution of the application is to be based.

The new independent claim 1 being directed to a method of deciding on performing a communication connection changeover is based on original claims 1 and 4. The new independent claims 13, 25, and 32 are based on original claims 14, 27 and 35 and amended in correspondence with the new claim 1. Furthermore, original claims 4, 17, and 30 are cancelled and the remaining claims are renumbered accordingly.

As defined in the new independent claims, the present invention is directed to a mechanism for performing a connection changeover of a subscriber terminal in a (at least) dual-band communication environment, such as a WLAN environment. According to the invention, communication

information indicating the dual-band capability are broadcasted from an access node of the communication connection in a beacon packet received by the subscriber terminal and processed so as to be used for a decision on a changeover to another band.

On the other hand, according to document GB 2 373 966 (referred to hereinafter as reference D1), there is described a system used for network information monitoring and distribution by distributed radio. As described, for example, on page 4, third paragraph, of D1, shared network information can include, amongst others, network configuration information and can be relevant to multiple networks, frequency carriers etc. The system structure according to reference D1 is such that communication devices connected to a first network (e.g. W-CDMA) communicate with communication devices connected to a second network (e.g. GSM) and transmit/receive network information between the communication devices.

However, the network information according to reference D1 is always collected first by the communication devices, not by the access node, and then relayed to another communication device after a request. Furthermore, it is to be noted that reference D1 does not describe or even suggest that the access nodes (i.e. base station and the like, as defined in page 3, last paragraph of D1) are able to transmit information related to the ability of communicating on more than one frequency.

Hence, the subject matter of the new independent claims is substantially different to that what is disclosed in reference D1. Reference D1 does neither disclose that the network information is directly transmitted from the access node to the communication devices by means of a beacon

frame nor that the access node's network information indicates whether the transmitting access node is capable to communicate on two or more frequency bands.

Thus, the subject matter of the independent claims is definitely novel.

However, it also involves the required inventive step.

Even if the person skilled in the art combines reference D1 with the disclosure of document WO 99/05873 (referred to hereinafter as reference D2) he would not be able to obviously derive the claimed subject matter.

It is true that reference D2 describes the usage of pilot signals or beacon signals transmitted from a base station for the establishment of a communication connection of a mobile station (see, for example, page 7, lines 13 to 21 of D2) as well as for a handover decision.

However, reference D2 is completely silent about the feature that the beacon signal (which is, according to reference D2, the signal from the base station to the mobile station) contains any used frequency band information. In contrast, reference D2 describes only that a message comprising information on more than one beacon signal (i.e. on more than one base station or connection possibilities for the mobile station) which are so-called PSMMs (pilot strength measurement messages) is transmitted from the mobile unit to the base station, i.e. diametrically opposed to the direction in which the network information according to the present invention is transmitted.

In other words, reference D2 is related to the normal handover between two base stations on the basis of signal strength measurements. However, there can not be found any disclosure or suggestion concerning the features of the new independent claims, which are also not known from reference D1, i.e. that the beacon packet from the access node comprises information on frequency bands of the same access node. Therefore, since the totality of the features defined in the independent claims 1, 13, 25, and 32 is not disclosed or even suggested in the cited prior art, the person skilled in the art is not able to derive the claimed subject matter on the basis of the knowledge on references D1 and D2 without requiring a further inventive activity.

Thus, it is respectfully submitted that the claimed invention distinguishes over the cited prior art and defines patentable subject matter.

Assuming that the new claims will provide at least a basis for an allowable claim version, it is requested that the Examiner reconsiders his previous opinion and issues an positive report on the patentability of the present application.

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Enclosure:
- New claims 1 to 43

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NEW CLAIMS 1 to 43

1. Method of deciding on performing a communication connection changeover of a subscriber terminal (T1) in a wireless communication network comprising at least one access node (AP1, AP2, AP3), wherein said subscriber terminal is able to communicate with an access node in said wireless communication network on two or more frequency bands,

said method comprising the steps of:

detecting communication information from said at least one access node, said communication information comprising information indicating whether the at least one access node is capable to communicate on two or more frequency bands;

transmitting said communication information from said at least one access node to said subscriber terminal by broadcasting said communication information from said at least one access node to said subscriber terminal incorporated in a beacon packet;

processing the transmitted communication information and determining a communication connection capability of the transmitting access node on the basis of the frequency band information; and

using the processing result for a decision on a communication connection changeover of the subscriber terminal.

2. Method according to claim 1, wherein said wireless communication network is a WLAN, preferably based on an IEEE 802.11 standard.

3. Method according to claim 2, wherein said two or more frequency bands comprise a frequency band of 2.4 GHz and one or more frequency bands between 5 and 6 GHz.

4. Method according to any of the preceding claims, wherein said information in said communication information comprise a multiple band indicator related to the transmitting access node.

5. Method according to any of the preceding claims, wherein said information in said communication information comprise a traffic load indicator related to the frequency bands of the transmitting access node.

6. Method according to any of the preceding claims, wherein said information in said communication information comprise a frequency band coverage indicator related to frequency bands of neighboring access nodes of the transmitting access node in the wireless communication network.

7. Method according to any of the preceding claims, wherein said information in said communication information comprise a frequency channel indicator for indicating the frequency channel used by the access node at the respective frequency band.

8. Method according to any of the preceding claims, wherein said processing step further comprises steps of

detecting a signal strength indicator on a predetermined frequency band; and

comparing the detected signal strength indicator with a predefined threshold value, wherein the result of the comparison indicates an estimation of the connection capability of an access node on another frequency band.

9. Method according to any of the preceding claims, wherein the decision on a communication connection changeover is made by the subscriber terminal.

10. Method according to any of the preceding claims, wherein a result of the decision on a communication connection changeover of the subscriber terminal is a change of the communication connection from the present frequency band to another frequency band which is common to the subscriber terminal and the access node associated with the subscriber terminal.

11. Method according to any of claims 1 to 9, wherein a result of the decision on a communication connection changeover of the subscriber terminal is a change of the communication connection from the current access node to a specific frequency band of a neighboring access node which is common to the subscriber terminal and the neighboring access node to be associated with the subscriber terminal.

12. Method according to any of the preceding claims, wherein communication information transmitted from two or more access node in the wireless communication network are processed in said processing step.

13. System for deciding on performing a communication connection changeover of a subscriber terminal (T1) in a wireless communication network comprising at least one access node (AP1, AP2, AP3), wherein said subscriber terminal is able to communicate with an access node in said wireless communication network on two or more frequency bands,

said system comprising:

means for detecting and transmitting communication information from said at least one access node to said subscriber terminal, said communication information comprising information indicating whether the transmitting access node is capable to communicate on two or more frequency bands, wherein said means for detecting and transmitting the communication information of the access node are adapted to incorporate the communication information in a beacon packet broadcasted to said subscriber terminal;

means for processing the transmitted communication information so as to determine a communication connection capability of the transmitting access node on the basis of the frequency band information; and

means for deciding on a communication connection changeover of the subscriber terminal by using the processing result.

14. System according to claim 13, wherein said wireless communication network is a WLAN, preferably based on an IEEE 802.11 standard.

15. System according to claim 14, wherein said two or more frequency bands comprise a frequency band of 2.4 GHz and one or more frequency bands between 5 and 6 GHz.

16. System according to any of claims 13 to 15, wherein said information in said communication information comprise a multiple band indicator related to the transmitting access node.

17. System according to any of claims 13 to 16, wherein said information in said communication information comprise a traffic load indicator related to the frequency bands of the transmitting access node.

18. System according to any of claims 13 to 17, wherein said information in said communication information comprise a frequency band coverage indicator related to frequency bands of neighboring access nodes of the transmitting access node in the wireless communication network.

19. System according to any of claims 13 to 19, wherein said information in said communication information comprise a frequency channel indicator for indicating the frequency channel used by the access node at the respective frequency band.

20. System according to any of claims 13 to 19, further comprising means for detecting a signal strength indicator on a predetermined frequency band; wherein said means for processing are adapted to compare the detected signal strength indicator with a predefined threshold value, the result of the comparison indicating an estimation of the connection capability of an access node on another frequency band, and said means for deciding on a communication connection changeover are adapted use the result of said comparison.

21. System according to any of claims 13 to 20, wherein the means for deciding on a communication connection changeover is located in the subscriber terminal.

22. System according to any of claims 13 to 21, wherein the means for deciding on a communication connection changeover are adapted to decide to change the communication connection from the present frequency band to another frequency band which is common to the subscriber terminal and the access node associated with the subscriber terminal.

23. System according to any of claims 13 to 21, wherein the means for deciding on a communication connection changeover are adapted to decide to change the communication connection from the current access node to a specific frequency band of a neighboring access node which is common to the subscriber terminal and the neighboring access node to be associated with the subscriber terminal.

24. System according to any of claims 13 to 23, wherein the means for processing the transmitted communication information are adapted to process communication information transmitted from two or more access node in the wireless communication network.

25. Access node in a wireless communication network, said access node communicating with at least one subscriber terminal wherein said subscriber terminal is able to communicate with the access node on two or more frequency bands,

said access node comprising:

means for detecting and transmitting communication information to said subscriber terminal, said communication information comprising information indicating whether the access node is capable to communicate on two or more frequency bands, wherein said means for detecting and transmitting the communication information are adapted to incorporate the communication information in a beacon packet broadcasted to said subscriber terminal.

26. Access node according to claim 25, wherein said wireless communication network is a WLAN, preferably based on an IEEE 802.11 standard.

27. Access node according to claim 26, wherein said two or more frequency bands comprise a frequency band of 2.4 GHz and one or more frequency bands between 5 and 6 GHz.

28. Access node according to any of claims 25 to 27, wherein said information in said communication information comprise a multiple band indicator related to the access node.

29. Access node according to any of claims 25 to 28, wherein said information in said communication information comprise a traffic load indicator related to the frequency bands of the access node.

30. Access node according to any of claims 25 to 29, wherein said information in said communication information comprise a frequency band coverage indicator related to frequency bands of neighboring access nodes of the access node in the wireless communication network.

31. Access node according to any of claims 25 to 30, wherein said information in said communication information comprise a frequency channel indicator for indicating the frequency channel used by the access node at the respective frequency band.

32. Subscriber terminal communicating in a wireless communication network comprising at least one access node (AP1, AP2, AP3), wherein said subscriber terminal is able to communicate with an access node in said wireless communication network on two or more frequency bands,

said subscriber terminal comprising:

means for receiving communication information transmitted from at least one access node, said communication information comprising information indicating

whether the transmitting access node is capable to communicate on two or more frequency bands, and being transmitted from said at least one access node to said subscriber terminal by broadcasting said communication information from said at least one access node to said subscriber terminal incorporated in a beacon packet;

means for processing the transmitted communication information so as to determine a communication connection capability of the transmitting access node on the basis of the frequency band information; and

means for deciding on a communication connection changeover of the subscriber terminal by using the processing result.

33. Subscriber terminal according to claim 32, wherein said wireless communication network is a WLAN, preferably based on an IEEE 802.11 standard.

34. Subscriber terminal according to claim 33, wherein said two or more frequency bands comprise a frequency band of 2.4 GHz and one or more frequency bands between 5 and 6 GHz.

35. Subscriber terminal according to any of claims 32 to 34, wherein said means for receiving the communication information means of the access node are adapted to extract the communication information from a beacon packet broadcasted from the access node.

36. Subscriber terminal according to any of claims 32 to 35, wherein said information in said communication information comprise a multiple band indicator related to the transmitting access node.

37. Subscriber terminal according to any of claims 32 to 36, wherein said information in said communication information comprise a traffic load indicator related to the frequency bands of the transmitting access node.

38. Subscriber terminal according to any of claims 32 to 37, wherein said information in said communication information comprise a frequency band coverage indicator related to frequency bands of neighboring access nodes of the transmitting access node in the wireless communication network.

39. Subscriber terminal according to any of claims 32 to 38, wherein said information in said communication information comprise a frequency channel indicator for indicating the frequency channel used by the access node at the respective frequency band.

40. Subscriber terminal according to any of claims 32 to 39, further comprising means for detecting a signal strength indicator on a predetermined frequency band; wherein said means for processing are adapted to compare the detected signal strength indicator with a predefined threshold value, the result of the comparison indicating an estimation of the connection capability of an access node on another frequency band, and said means for deciding on a communication connection changeover are adapted use the result of said comparison.

41. Subscriber terminal according to any of claims 32 to 40, wherein the means for deciding on a communication connection changeover are adapted to decide to change the communication connection from the present frequency band to another frequency band which is common to the subscriber

terminal and the access node associated with the subscriber terminal.

42. Subscriber terminal according to any of claims 32 to 40, wherein the means for deciding on a communication connection changeover are adapted to decide to change the communication connection from the current access node to a specific frequency band of a neighboring access node which is common to the subscriber terminal and the neighboring access node to be associated with the subscriber terminal.

43. Subscriber terminal according to any of claims 32 to 42, wherein the means for processing the transmitted communication information are adapted to process communication information transmitted from two or more access node in the wireless communication network.